in his excellent tabular statements of cases. With the apparatus supplied to state institutions, it is useless to insist that *weight of body*, *weight of brain* and *stature* should be given in case of every autopsy, but no really available data can be obtained for this country until this is done. For anyone who may wish to repeat and confirm Prout's observations, more exact statement as to the location examined will be necessary, and some indication of the methods employed. Definiteness upon these points would have added greatly to the practical value of the work.

Der Einfluss des Trigeminus auf die Hornhaut. J. GAULE. Centralblatt f. Physiol., Bd. V., pp. 409-15. 1892.

Wie beherrsht der Trigeminus die Ernährung der Hornhaut. Ibid., pp. 450-56.

Spinalganglien und Haut. Ibid., Bd. V., pp. 689-97.

Spinalganglien des Kaninchens. Ibid., Bd. VI., pp. 313-26.

Weitere Experimente an den Spinalganglien und hinteren Wurzeln. Ibid., Bd. VI., pp. 785-802. 1893.

Die trophischen Veränderungen und die Muskelzerreissungen. Ibid., Bd. VII., pp. 646-54. 1894.

Die trophischen Eigenschaften der Nerven. Berliner klin. Wochenschr., Vol. XXX., pp. 1065-68 and 1099-1102.

Zur Frage über die trophischen Functionen des Trigeminus. C. ECHARD. Centralbl. f. Physiol., Bd. VI., pp. 328-32. 1892.

Ueber das Vorkommen von Muskelzerreissungen an gefesselten Kaninchen. H. E. HERING. Ibid., Bd. VII., No. 18.

Erwiderung auf Herrn Prof. Gaule's Bemerkungen über die bei gefesselten Kaninchen vorkommenden Muskelzerreissungen. H. E. HERING. Ibid., Bd. VIII., pp. 854-7.

The above group of papers may be cited as an interesting contribution to the subject of the trophic influence of the nervous system. For several years Gaule has been working to bring some physiological explanation to bear upon the array of facts, like that of herpes zoster, decubitus, atrophy of glands and muscles, after their nerves are severed, and many others, which seem to indicate clearly a trophic action of the nerves. He begins with the cornea, where effects may be most clearly observed, and performing Majendie's experiment on the fifth nerve and Gasserian ganglion, makes out definite changes in the cornea, drying and necrosis of the epithelium cells, wholly dependent on the operation and which cannot be thwarted by any possible protection of the surface. The fifth nerve was cut in different experiments at three points, through the Gasserian ganglion, between pons and ganglion and between cornea and ganglion. The result upon the cornea did not follow when the cut was made between pons and ganglion, and this at once proves that insensibility of the cornea cannot be the cause of its becoming dry, and in consequence, necrotic; but that necrosis of the cells is the cause of its drying, and hence that the cells of the Gasserian ganglion are true trophic centers for the cornea. Thus the usual explanation is exactly reversed. Similar observations were made upon the skin in frogs and rabbits, the hair interfering with entirely satisfactory study of the latter. In the frogs, destruction of the spinal ganglia was found to cause changes com-

parable with those described for the cornea, with certain differences in the dorsal and ventral regions. These consisted in a drying of the dorsal parts and a corresponding swelling with turgescence of the ventral. Beside changes in skin and cornea, injury to the spinal ganglia produces most unaccountable alterations in many of the deeper organs. The adrenal bodies show constant change, and the reproductive gland of the opposite side becomes shrunken and of especial interest; the muscles become the seat of active changes. It is to these that the author devotes chief attention in his later papers. They consist in hemorrhages, varying in size from that of a ten cent piece or larger to that of a millet seed, into the substance of the muscle or into the connective tissue septa. At first they seemed to occur throughout the entire muscular system, in greater or less numbers, out of all observable connection with known anatomical relations, "ganz unberechenbar" as to location. Later Gaule succeeded in demonstrating certain anatomical paths for two muscles, the biceps and psoas. The effect could be made to appear in the muscles by a number of operations upon the spinal ganglia, by stimulating with the interruption of a strong (four to five Daniel cells) constant current (an induction current was not effectual), and by cutting or cauterizing the ganglion. These must all be done without previously opening the sac or disturbing the blood supply of the ganglion.

Echard maintains that such flaws in the cornea, as Gaule describes in his first papers, are readily produced in rabbits by a little rough handling, a little dust, hair chippings and the like getting into the eyes, even if no operation whatever is made, or if the fifth nerve be cut close to the pons. Gaule answers this criticism by calling attention to the fact that the root of the fifth nerve contains many ganglion cells at its emergence from the pons. He also brings forward an experiment of crucial importance. If the Gasserian ganglion be cut upon one side and the root of the fifth nerve be cut upon the other side above the ganglion, where no cells occur, the cornea will degenerate upon the side of injury to the ganglion, and this cannot be prevented by care and protection, whereas the cornea on the other side remains normal. Here we have a satisfactory answer given to the old argument against trophic influence of nerves based upon insensibility and consequent neglect of parts concerned, both corneæ being, in this case, equally insensible.

Hering's work, done and reported apparently without reference to Gaule's experiments, goes to prove that hemorrhages in the muscles may be produced in rabbits by their voluntary efforts to escape, when simply tied in the manner usual for operation. These hemorrhages closely resemble those described by Gaule as trophic, and occur most frequently in the biceps and psoas, exactly the muscles most clearly affected in Gaule's experiments.

This brings us to a consideration of Gaule's work upon the sympathetic ganglia. He found that if he stimulated or injured the superior sympathetic ganglion, changes invariably took place in the biceps and psoas muscles. The path of this influence, according to the author's view, must lie in the spinal cord and must reach this through the ramus communicans. From stimulation upon one side, the muscles of both sides are affected. Further, a peculiar complication exists in the fact that one branch of the superior cervical ganglion acts to inhibit all trophic influence of the ganglion upon the above named muscles. If this twig is stimulated, stimulation of the ganglion at the same time produces no effect. So definite is the reaction that Gaule is able to lay bare the living biceps and upon stimulation of the ganglion, actually observe the

whole process. As stimulation of the ganglion proceeds, the muscle, at about the middle, near the entrance of the nerve, first becomes rough and irregularly contracted, then œdematous. The muscle fibers apparently dissolve and tear apart under the strain of normal tonus; the capillaries, unable to support the strain, are torn, thus producing the hemorrhage, and in from three to ten minutes may be seen the formation of a typical ulcer. After the operation this heals slowly, with formation of a scar.

Thus Gaule is able to prove, as he thinks, the absence of all connection between his experiments and those of Hering. It is further stated that the rabbits experimented on are not tied down, but held by the hand, and that rupture of the muscle fibers may occur without perceptible voluntary contractions. The essential fact, upon which Gaule insists, is that trophic changes may be produced in muscle substance by which its power to resist strain is greatly diminished. He experiments further to prove this by extending similar muscles with different weights. Normally, a weight of 5,000 gms. does not cause rupture of muscle fibers, while 500 gms. does so invariably, if the spinal ganglia are injured. Thus resistance is lessened to at least one-tenth of normal.

We can no longer, according to Gaule, speak of "trophic nerves." The whole nervous system is trophic.

II.—ANTHROPOLOGICAL PSYCHOLOGY.

A. F. CHAMBERLAIN, PH. D.

LINGUISTICS (and related subjects).

Further Notes on Indian Child-Language. A. F. CHAMBERLAIN. *Amer. Anthrop.* (Washington), VI. (1893), 321-322.

Notes that it is the mothers who teach the children many of these words.

Secret Language of Children. O. CHRISMAN. *Science* (New York), XXII. (1893), 303-305.

Treats of the secret language in use among school-children and others, and contains original observations on the Tut-language, as spoken by the children in Gonzales, Texas.

On the Words "Anahuac" and "Nahuatl." D. G. BRINTON. *Amer. Antiq.* (Chicago), XV. (1893), 377-382.

An interesting onomatological study. The author brings out the curious fact that in the Zapotec Indian tongue of Mexico (as also in Huastec), "the verb 'to know' is a reduplication of the first person of the personal pronoun *na*, 'I;' *na-na*, 'to know,' literally, 'my mine,' that which is with me, essentially mine."

The Origin of Literary Forms. C. LETOURNEAU. *Pop. Sci. Mo.* (New York), XLIII. (1893), 673-682.

Treats of the forerunners and the beginnings of literary æsthetics and their progress through the various periods of human development. Refers to the Fuegians, ancient Greeks and Latins, Chinese. The author considers "that there are good grounds for supposing that women may have especially participated in the creation of this lyric of the erotic kind."